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ABSTRACT

This paper selectively reviews current knowledge about the effects of alcohol, cocaine, and marijuana. Highlights of the review include findings that: (1) gender differences in alcohol and polysubstance users are reflected in epidemiological, biobehavioral, and neuroendocrine factors; (2) women and men exhibit different patterns of alcohol consumption, and also differently absorb and metabolize alcohol; (3) onset of dependence in women appears truncated, and women and men experience different social consequences; (4) gender differences also occur in cocaine and in marijuana users; (5) women who use cocaine are more likely to experience depressive symptoms, and women who smoke marijuana are less likely to accelerate smoking rates; and (6) accumulating evidence points to some contribution of family history of alcoholism to polysubstance use, and all substances have deleterious effects on the reproductive system. Six areas for future research are suggested. These focus on researching effects of substances on the neuroendocrine system; individuals presenting for treatment with dual diagnoses; the need to analyze broad factors influencing substance use; changing patterns of substance abuse; and primary prevention. Seven tables and a bibliography of 63 references are included.
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GENDER DIFFERENCES IN ALCOHOL AND POLYSUBSTANCE USERS

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Abstract:

Gender differences in alcohol and polysubstance users are reflected in epidemiological, biobehavioral, and neuroendocrine factors. This paper selectively reviews current knowledge about alcohol, cocaine, and marijuana effects. Women and men exhibit different patterns of alcohol consumption, and also differentially absorb and metabolize alcohol. Onset of dependence in women appears truncated, and women and men experience different social consequences. Gender differences also occur in cocaine and in marijuana users. Women who use cocaine are more likely to experience depressive symptoms, and women who smoke marijuana are less likely to accelerate smoking rates. Accumulating evidence points to some contribution of family history of alcoholism to polysubstance use, and all substances have deleterious effects on the reproductive system. Six topics for future research are proposed.

Key words: male-female differences, epidemiology, alcohol, marijuana, cocaine, treatment outcome research

Introduction:

Over the past 20 years shifts in perceptions of women and substance abuse problems have accompanied a changing sociopolitical climate. The women's movement exposed a wide range of pertinent social issues and focused attention on the legitimacy of research and treatment for women as a "special population". Scant attention in earlier alcohol research appears associated with contradictory beliefs that sociocultural factors protected women from alcohol abuse, that alcohol dependence was similar in men and women, or that alcoholic women were more deviant, psychologically disturbed, and difficult to study and treat (Clayton, Voss, Robbins, & Skinner, 1986; Mello, 1980). Studies of male alcoholics present fewer logistical problems, such as retaining surnames at marriage (Hyman, 1976), but some investigations awaited development of techniques capable of measuring neuroendocrine hormones (Cicero, 1980) to permit careful studies of alcohol and other substance use effects on reproductive function in women (Mello, 1988; Van Thiel & Gavalier, 1988).

Recent efforts have not yet closed the gaps in knowledge (Clayton et al, 1986), and reports continue to appear with gender unspecified and unanalysed. This review discusses past knowledge and current findings, points to a number of unanswered questions, and provides research recommendations that emerge from empirical data. Materials include a spectrum of information about biological, psychological, and sociocultural aspects of substance abuse.

Gender Differences in Polysubstance Use:

A combination of social factors contribute to women's intercurrent polysubstance use (Clayton et al. 1986). Many differences identified over 10 years ago (Ferrence, 1980; Ferrence & Whitehead, 1980) still persist:

1. Women are socialized differently: they have fewer assertive skills and need more supportive networks.
2. Women's social status generally derives from men (e.g., fathers, husbands), and their supply of drugs also are likely to be obtained from men, whether boyfriends, conjugal partners, or physicians.
3. Women are typically expected to play more key family roles.
4. Women typically are responsible for birth control and parenthood.
5. Women have more medical problems and are perceived differently when they complain about illness.
6. Women have fewer and less lucrative vocational options than men.
7. Women have different experiences with the criminal justice system.
8. Women who commit deviant behaviors experience more social stigma.
9. Women addicts often have been sexually abused.
10. Most treatment programs have traditionally focused on the needs of men.

More women are employed now, and other factors are slowly shifting, but overall there has been little change. Studies of women's substance abuse are still in their infancy (Clayton et al., 1986), and many basic epidemiological questions remain to be answered.

Current Epidemiology

The newest NIDA cross-sectional Household Survey survey was conducted in 1988 (NIDA, 1989). Tables 1 through 7 display findings by drug, gender, and age. With regard to alcohol, a majority of all American women (63.3%) used alcohol during the previous year (versus 68.1% for men) and slightly less than half (46.7%) during the previous month (versus 60.0% for men). In the younger age group, (18 to 34), rates for lifetime use were 84.5% for males and 77.9% for females, and roughly 15% of women and 40% of men used alcohol at least once per week.

The majority (61.7%) of all young adults (18-34) had tried some illicit drug in their lifetimes, and rates were 64.4% and 60.0% for males and females, respectively. Males were likelier to continue use, since 10% more males than females ages 18 to 34 had used an illicit drug within the previous year, and 7.3%, the previous month. About 60% of men and women ages 18 to 34 had ever used an illicit drug, in contrast to only 25% of boys and girls ages 12 to 17. Overall, cocaine use has declined since the 1985 Household Survey (NIDA, 1985), but more than 20% of men and women ages 18 to 34 had used cocaine at least once. Experimentation with cocaine was highest in the 18 to 25 and 26 to 34 year old, during the previous year and previous month, with males consistently out-ranking females--about 15.1% versus 9.2% in the 18 to 25 group for use in previous year, and from 6.0% versus 3.0% for use during the previous month. About 1.6% of males and 0.4% of females ages 18 to 34 used cocaine at least once per week. For the 26 to 34 year old group, use by males again outranked females (11.2% versus 4.9%) during the previous year, and 3.6% versus 1.6% for the previous month.

Marijuana use also has declined since the 1985 Household Survey (NIDA, 1985). For marijuana, use during the previous month was virtually identical in males and females 12 to 17 years old, but use during the previous year and previous month was almost 10% higher in males than females ages 18 to 25. For persons using marijuana at least once per week, the highest rate (13.6%) was observed for males ages 18 to 25 (versus 6.0% of females). In the 12 to 17 year old group, rates for males (4.1%) and females (3.7%) were virtually identical.

 Tables 1-7 about here

Frequently cited differences between male and female alcoholics:

Environmental and biological factors differentiate alcohol problems.

1. Familial/genetic factors: Alcoholic women are more likely to have an alcoholic role-model in their nuclear families, and to have alcoholic spouses (assortative mating).

2. Onset: Women usually have drinking problems at later ages.

3. Consumption Patterns: Women typically consume less alcohol than men, and are less likely to drink daily, to drink continuously, or to engage in binges.

4. Course of illness: Women progress rapidly from onset of drinking through later stages of alcoholism--i.e., "telescoping."

5. Attribution of Etiology: Women frequently attribute their drinking to a traumatic event or stress. Events are often related to reproductive dysfunction or crises peculiar to women.

6. Concurrent psychological disorders: Some men have anti-social personality disorder; more women have affective disorders.

7. Societal Response: Women experience more social disapproval of alcohol use and alcoholic women are more stigmatized.

8. Social sequelae: Consequences for men affect jobs or career paths. Disruptions for women more likely occur in family life, and more women are separated or divorced.

9. Medical sequelae: Women have more liver cirrhosis, but alcohol is a direct gonadotoxin in men.

10. Personal responses to illness: Alcoholic women are generally characterized as feeling more guilty, anxious, or depressed.

Differences in alcohol consumption, absorption, metabolism, and health consequences

Women typically develop problems at later ages and usually drink less. They are less likely to drink daily, to drink continuously, or to engage in binges, and progress rapidly from onset of drinking through later stages of alcoholism. Are alcohol problems less severe for women? Numerous reports associate alcohol abuse in women with serious gynecological and obstetric dysfunctions (Gavaler, 1988; Mello, 1980; Mello, 1988), as well as with the process called "telescoping," that is, more rapid development of cardiovascular, gastrointestinal, and liver diseases (Blume, 1986; Wilsnack, Wilsnack, & Klassen, 1984; Wilsnack, Klassen, & Wilsnack, 1984). Alcohol effects on the developing fetus can promote Fetal Alcohol Syndrome (FAS) or Fetal Alcohol Effects (FAE), including largely irreversible low birth weight, dysmorphogenesis, and mental retardation (Streissguth, Sampsom, & Barr, 1989).

Women's consumption patterns are more variable than men's. Women's absorption rates and blood alcohol levels also are more variable, and effected by progesterone levels that fluctuate across the menstrual cycle (rising after ovulation and before onset of menses) or during pregnancy. Women have lower mean body water volume (Vd) (51%) than men (65%). Since alcohol is water soluble, women will attain higher peak blood alcohol levels at the same dose of alcohol.

Alcohol disrupts the hypothalamic-pituitary-gonadal axis in both men and in women. It was well known that alcohol is a direct gonadotoxin in men and that alcoholism is associated with disruptions of male reproductive function. Impotence, low testosterone levels, testicular atrophy, gynecomastia, and diminished sexual interest are consistently reported (Cicero, 1980), but until

very recently, there has been relatively little research on alcohol's effects on reproductive function in women (Mello, 1988; Mello, Mendelson, & Teoh, 1989).

More studies are needed to identify specific mechanisms involved in neuroendocrine effects of ethanol in women. Pathophysiologic effects of chronic alcohol intake on reproductive function may be the result of direct toxic effects of alcohol on the hypothalamus, pituitary or ovaries, or of interaction effects related to estrogen and progesterone. Some major alcohol-related disorders of the female reproductive system include amenorrhea, anovulation, luteal phase dysfunction, ovarian atrophy, spontaneous abortion, and early menopause. Postmortem studies of alcoholic women have found evidence of ovarian atrophy (Mello et al., 1989).

In one series of studies, endocrine profiles were studied for 18 women (age 17-58) (Teoh, Lex, Cochin, Mendelson, & Mello, 1989). All were detoxified and showed no signs of withdrawal at sample collection. All women had physical examinations and laboratory studies, including blood hemogram and chemistry, and analysis of LH, FSH, prolactin, estradiol, progesterone, and cortisol levels. Twelve women were diagnosed as alcohol dependent according to DSM-III-R criteria (American Psychiatric Association, 1987), and their consumption ranged from 42-324 grams per day. Six women were diagnosed as polydrug dependent. In addition to alcohol (84-830 g/day), cocaine was the most frequently abused drug followed by tranquilizers, sedatives, marijuana, amphetamines and opiates.

Although specific mechanisms of alcohol- and drug-induced derangements have yet to be determined, hyperprolactinemia may cause amenorrhea and disrupt the menstrual cycle. Fifty percent of the 12 alcoholic women had hyperprolactinemia (22.3-87.5 ng/ml) independent of amount and duration of

alcohol use, and one patient had secondary amenorrhea with a normal prolactin level and low levels of LH and estradiol. Two polysubstance dependent women had hyperprolactinemia (25.7 and 29.6 ng/ml), and one had secondary amenorrhea, with normal prolactin, but low LH, FSH and estradiol. Hormone levels were consistent with reported menstrual cycle phase or menopausal range in 16 patients.

Polysubstance dependent women reported beginning sexual activity at an earlier age (mean = 15.7 years $\pm$ 2.6) than alcohol dependent women (mean = 18.6 years $\pm$ 3.3). Although 50% of alcohol dependent women had had no live births, one polysubstance dependent woman reported twelve conceptions, resulting in 6 live births, one stillbirth, and five spontaneous abortions. Thus the consequences of substance use on reproductive capacity are far from clear, and in all likelihood are affected by other environmental factors, such as nutrition or trauma (Lex, Teoh, Lagomasino, Mello, & Mendelson, 1988).

Hugues and colleagues (Hugues et al., 1980) studied hypothalamo-pituitary function in 31 alcoholic women ages 29 to 66 who had chronic pancreatitis or cirrhosis of the liver. The majority (67%) were currently amenorrheic. These subjects were compared with 12 healthy postmenopausal women and 10 normal women of reproductive age. Four women had severe oligomenorrhea (scanty or infrequent menstrual flow), six had mild oligomenorrhea or cycles of normal length. Several distinct patterns of hypothalamo-pituitary ovarian activity were identified. Normal menopause had occurred in eight amenorrheic patients, accompanied by low estrogen level, high basal gonadotrophin secretion and a distinct LHRH-induced gonadotrophin response. In a second group five women had hypothalamic amenorrhea associated with low estrogen, and low gonadotrophin levels, but adequate response to LHRH. Eight perimenopausal women, ages 43-51 were characterized by adequate

estradiol levels with a preferential FSH increase. Other subjects still responded to ovarian stimulation, but six women had inadequate luteal phase, and five women had anovulation related to defects in cyclic control of gonadotrophin secretion.

Another study of reproductive compromise in women screened for alcohol-related problems in obstetric-gynecologic patients (Russell & Bigler, 1979). A self-administered questionnaire screened 499 women in an outpatient clinic at a general hospital. Criteria for alcohol-related problems were reports of heavy alcohol consumption (QFV), with heavy drinking defined as consumption of three or more drinks daily (regardless of quantity) for patients drinking two to three times a month or five or more drinks on more than one-half of all drinking episodes. Between 10 to 14% reported heavy drinking. A combination of factors was required to identify all heavy drinkers. Individuals identified by counsellors were younger (mean 26 years $\pm$ 12) women who consumed a mean of 2.5 $\pm$ 1.8 ounces of alcohol per episode. These women had thus far avoided consequences of heavy alcohol intake since they associated with people who did not criticize their drinking and they had no work or other responsibilities to interfere with drinking.

The most frequently endorsed questionnaire items associated with heavy alcohol intake were blackouts (55%), wanting to curtail drinking (48%), family history of drinking problems (42%), seeking help for emotional problems (33%), experiencing drinking-related family problems (28%), friends or relatives concerned about their drinking (25%), having siblings with a drinking problem (23%), receiving physicians' advice to cease drinking (21%), and having a husband with a drinking problem (18%) (Russell & Bigler, 1979).

Heavy alcohol consumption also was associated with obstetric-gynecological clinic patients under age 40 who reported obesity and

gastrointestinal pain. In addition, frequently reported one or more physical complaints, or one or more psychological problems. A similar study of women treated in an obstetrics-gynecology practice in a middle class suburb and in a solo practice drawing patients from an urban area (Halliday, Booker, Cleary, Aronson, & Delbanco, 1986). All women between the ages of 18 and 44 were screened for alcohol consumption patterns. Heavy drinking was more frequent in gynecological patients (19%) than in obstetric patients (11%).

Course of Illness in Women and Men:

Consistent differences in the course of alcohol dependence have been reported repeatedly. Not only do women with alcohol problems report heavy drinking at a later age, drink smaller quantities, and more frequently drink alone, but they also use more tranquilizers, have more psychiatric treatment, and are less likely to become known to the criminal justice system (Bromet and Moos, 1976). Women also are more likely to have a family history of alcohol problems and to have spouses with alcohol problems (Cotton, 1979).

As noted, "telescoping" is a popular term for the apparently accelerated course of symptom severity in alcoholic women. In a sample of 30 men and 16 women studied by Orford and Keddle (1985), median number of years since problem onset was 11.0 for men versus 3.6 for women, and typical heavy alcohol use per day was 220 gms for men versus 120 gms for women. Further, the dominant pattern of drinking for women in the six months prior to treatment was regular drinking versus sporadic drinking, while half the men reported regular drinking and the other half reported binge drinking. In a smaller study (Crawford and Ryder, 1986) eight men and eight women had significant differences in years of heavy drinking (2.6 ± 2.7 for women versus 9.1 ± 5.3 for men), and in consumption during a recent typical week (171.3 ± 82.9 alcohol "units" for men versus 90.3 ± 49.1 for women). A similar observation

was made by Beckman and Amaro (1986) in a study of 54 men and 67 women. Comparable patterns of time course and consumption have been observed for female opiate addicts (Kosten, Rounsaville, & Kleber, 1985).

Parrella and Filstead (1988) examined the age of onset in male and female alcoholics. They developed an early onset severity index wherein development of alcoholism is represented as a sequence of landmark events of greater severity behaviors and consequences. Subjects were 1,940 alcoholic men (1,392 or 72%) and women (548 or 28%) admitted to a residential treatment facility. Women were significantly older when regular drunkenness began, when they realized that alcohol gave relief from withdrawal symptoms, when a significant other first identified the alcohol problem, when they first tried to stop drinking, and when they realized that alcohol use was a problem. Specifically, 48% of men had early onset, while roughly 31% of women reported regular drunkenness before age 25. In addition, 24% of men had tried to stop drinking at or before age 25, versus 18% of women. However, of all early onset subjects, a larger percentage of women than men had attained severe levels of alcohol problems. Thus the milestones in development of alcohol dependence clearly follow a sequence, but Parrella and Filstead (1988) argued that cutoff points for early onset are gender-specific. Thus, occurrence of these milestones by age 25 may indicate that early onset in women is associated with more rapid progression to severe alcohol problems.

A prospective follow-up study (Smith, Cloninger, & Bradford, 1983) examined predictors of mortality for alcoholic women. Feighner criteria were used to ascertain alcoholism in 103 women who had been admitted to one public and one private psychiatric hospital during 1967 and 1968. Mean age at admission was 44 years (range: 18-67 years). The sample included 44% who were married, 49% separated, divorced, or widowed, and 7% who had never married.

Mean number of years drinking prior to admission was nine (range: 1-38 years). Three-quarters of the subjects had had previous in-patient admissions for alcohol problems. All subjects available from the original sample were reinterviewed in 1979 and 1980. Follow-up data were available for 92 subjects, including 21 women (31%) who were deceased at the time of follow-up survey.

Excess mortality in alcoholic women (compared to women in St. Louis city) yielded a ratio of 4.5:1. Alcoholic women were significantly younger at time of death (mean age 51 years) than St. Louis women (mean age 66.5 years). Approximately 75% of the cohort were white. Differential mortality also was observed between black women (42%) (close to seven times the expected rate) and white women (28%) (nearly four times the expected rate).

The largest numbers of deaths (29%) were attributed to pancreatitis, liver cirrhosis, and other liver disorders, and deaths from these causes occurred at a mean age of 44.9 years (range: 32-59). Violence and accidents accounted for another 26% of deaths, at a mean age at 49.5 (range: 28-70). Excess death rates from these causes more than doubled the overall rate for white women (20:8) than for black women (8:4), an unexplained finding. Only two deaths were identified as suicides, and these deaths also were violent. In addition, two women overdosed on combinations of alcohol and prescription medications, and thus might have been suicidal. Another three accidental deaths were attributed to fires related to cigarette smoking while drinking. In the sole homicide, a 54 year old woman was stabbed by a male drinking companion.

Thus, diseases of the digestive system, accidents, and violence accounted for (55%) of all deaths. Cancer, was the third-ranked cause accounting for 19% of deaths, but there was no significant difference in the

ratio of observed to expected deaths, while circulatory diseases accounted for 16% of deaths, and rates were only slightly higher for alcoholic women than for all women in St. Louis city. Ten percent of deaths were attributed to respiratory diseases, and occurred in older alcoholic women (mean age 60.7 years). Notably absent from these causes of mortality were diseases specifically effecting the reproductive system, such as ovarian or uterine cancer.

Four variables accounted for 27% of the variance in decreased survival status and classified 75% of the sample. Women who were older at treatment, who had onset of alcoholism prior to age 30, and who had a history of frequent binge drinking were at highest risk for early mortality. A primary diagnosis of antisocial personality also contributed an additional small percentage to the excess deaths. However, occurrence of liver cirrhosis, delirium tremens, convulsions, and severity of alcoholism, as measured by the number of symptoms and by daily drinking, added little to the overall variance. Unemployment and poor marital history also contributed little to the model. Thus, more global variables (duration and intensity of alcohol abuse) were better predictors of mortality than specific alcohol-related symptoms. Only abstinence was associated with reduced mortality. Women who identified themselves as "social" drinkers had a higher proportion of deaths, and their death rate was comparable to those of sporadic/variable drinkers (20% versus 17%). The highest percentage of deaths (54%) were among women who continued to drink steadily and in high volume.

Family History:

Alcoholism in women is more strongly correlated with a family history of alcohol problems than alcoholism in men (Cotton, 1979, Haver, 1987; McKenna and Pickens, 1981; Midanik, 1983). Thus, another area of current interest in

gender differences involves classification of types of alcoholism that might be inherited. There is compelling evidence that risk for the development of alcohol problems is significantly increased by a family history of alcoholism. Offspring of alcoholics are typically 4 to 5 times more likely to develop alcoholism than persons in the general population. The impact of genetic and familial factors has been demonstrated in men (Goodwin, Schulsinger, Hermansen, Guze, & Winokur, 1973; Goodwin et al., 1974). Studies of young men with and without family histories of alcoholism prior to the onset of drinking problems indicated that sons of alcoholic fathers may show less sensitivity to alcohol effects (Schuckit, 1984; Schuckit, 1985). Lower intoxication ratings and less body sway occurred in sons of alcoholic fathers after they had consumed a moderate amount of alcohol. Findings of less body sway have been confirmed in our studies of daughters of alcoholic fathers (Lex, Lukas, Greenwald, & Mendelson, 1988).

Adoption and cross-fostering studies conducted in Denmark and in Sweden provide basic findings on genetic factors in transmission of alcoholism. A study of Danish male adoptees compared men separated from alcoholic biological parents soon after birth and raised by nonrelatives and control adoptees. Of the 55 men separated from alcoholic biological parents, 18% (10) had alcoholism treatment or met clinical criteria for alcoholism, but only 5% (4) of the 78 control adoptees had had alcoholism treatment or met criteria for alcoholism. Thus, nearly 4 times the rate of alcoholism (3.6 : 1) was found for men separated from alcoholic biological parents (Goodwin et al., 1973). A similar study compared 49 Danish women separated from alcoholic biological parents soon after birth and raised by nonrelatives with 47 control adoptees. In each group, 4% were alcoholic or had serious drinking problems. Relative infrequency of alcoholism among Danish women and small sample size precluded

definite conclusions. Since the rate of alcoholism for Danish women fell between 0.1% to 1.0%, it was concluded that alcoholism in women might have a partial genetic basis (Goodwin, Schulsinger, Knop, Mednick, & Guze, 1977).

More recently, it has been argued that familial and genetic factors in inheritance of alcoholism in men cluster into at least 2 clinically identifiable alcohol dependence syndromes: Type I and Type II forms of alcoholism (Cloninger, Bohman, Sigvardsson, & von Knorring, 1985b). Using information from hospital, clinic, and registry records, Type I was identified as "milieu-limited" because expression of alcoholism was related to interplay with environmental factors and occurred later, while Type II designated as "male-limited," was associated with early onset of alcohol-related problems accompanied by impulsivity, risk taking, belligerence, and criminality.

From these studies it also has been alleged that the genetic factors in women with family histories of alcoholism are expressed differentially. Alcoholism in women with "milieu-limited" alcoholic fathers was found to be shaped by environmental conditions (i.e., exposure to alcohol, social status of adoptive father) superimposed on a biological substrate. In contrast, the female counterpart of "male-limited" alcoholism was found to be expressed primarily as somatization (typically complaints of abdominal, back, or neck pains) (Cloninger et al., 1985b). The highest prevalence of alcoholism in adopted-away women was found in those with alcoholic mothers (Bohman, Sigvardsson, & Cloninger, 1981).

Swedish adoption studies did not include information collected directly from either male or female alcohol dependent patients or direct study of persons involved in the criminal justice system. Nonetheless, there is evidence for possible genetic markers for alcoholism in women. In a national survey of drinking practices conducted in 1981, about 25% of surveyed adults

reported a family history of alcoholism (Midanik, 1983). For women, 16% total (12% fathers only); for men, 11% total (9% fathers only). Alcoholic women are more likely to have alcoholic parents than alcoholic men, alcoholism in fathers of treated female alcoholics may be as high as 61%, and in comparison with alcoholic men in the same treatment populations, alcoholic women typically report higher alcoholism rates in their siblings (Corrigan, 1980; Cotton, 1979; Lisansky, 1957; Swinson, 1980).

Evidence for changes in contributions of familial, non-familial, and genetic risk factors in transmission of alcoholism has been drawn from cross-sectional surveys and studies of families of alcoholic probands. Epidemiologic Catchment Area data for two sites showed increased prevalence of alcoholism, and decreased age of onset in males and females (Cloninger, Sigvardsson, Reich, & Bohman, 1986; Robins et al., 1984). Data from an ongoing family study of alcoholic probands and their first degree relatives in St. Louis were analyzed to identify the impact of secular trends on alcoholism prevalence, age of onset, and transmissibility (Reich, Cloninger, Van Eerdewegh, Rice, & Mullaney, 1988). Using Feighner criteria (Feigner et al., 1972), between 1978 and 1983 Cloninger, Reich and colleagues (Reich et al., 1988) studied 60 female and 240 male alcoholics, their fathers, mothers, brothers, sisters, and offspring (n = 831).

Alcoholism rates for sons and daughters of probands were higher than rates for their parents, and male and female probands had similar numbers of first degree alcoholic relatives. Relatives of alcoholic probands were grouped by age (under 25, 26-44, and over 45). By age 20, 52% of male relatives ages under 25, 20% of male relatives ages 26-44, and less than 10% of male relatives ages over 45 were alcoholic. By age 20 18% of female relatives ages under 25, and less than 5% of female relatives over age 26 were

alcoholic. Ages at onset were estimated by sex and birth cohort. Lifetime prevalence of alcoholism for persons born since 1955 was calculated at about 22% for males, and 10% for females. In contrast, prevalence of alcoholism for persons born before 1940 was calculated at about 12.3% for males, and 4% for females (Reich et al., 1988). Thus, the rates for females have more than doubled, while the rates for males have almost doubled.

Other findings from this study (Reich et al., 1988) indicate that younger cohorts show greater transmissibility (τ^2). It was estimated that τ^2 for males varied between 0.65-0.98, and τ^2 for females varied between 0.27-0.59. Nongenetic transmission was detected (0.63), with estimates of correlations between non-environmental factors common to brothers and sisters varying between 0.22 to 0.41. Maternal versus paternal transmission rates were similar, and same sex transmission rates were similar. Thus, age of onset and lifetime prevalence for women appear to approach characteristics of men, and the increase is strongest in children of alcoholic probands. Further, comparison of age of onset for Type I (over 25 years) versus Type II alcoholism from cross-fostering studies in Sweden (Cloninger et al., 1985b) suggested an overall increase in prevalence of Type II alcoholism (Reich et al., 1988). Other analysts (Kilbey & Sobock 1988) also support the contention that alcohol dependence in women has gradually increased during the last three decades.

A combination of familial, genetic, and environmental factors also are important for intercurrent polysubstance use (Clayton et al., 1986; Griffin, Weiss, Mirin, & Lange, 1989). However, familial or genetic relationships between polysubstance abuse and alcohol dependence do not appear to have been addressed in the Swedish studies. In the United states, intercurrent alcohol dependence with other drug abuse or dependence is an established clinical

reality in women as well as in men, and is of increasing concern. Women with alcohol problems are at further risk for polydrug use, including cocaine, marijuana, opiates, and psychotropic prescription medications (Clayton et al., 1986).

Gender Differences Among Hospitalized Cocaine Users:

There is comparatively little information about characteristics of male and female cocaine users. One recent study (Griffin, Weiss, Mirin, & Lange, 1989) compared sociodemographic characteristics, reasons for cocaine use, drug effects, depressive symptoms, and psychiatric diagnoses in 95 men and 34 women hospitalized for cocaine abuse.

Women were significantly younger than men at time of first drug use (mean 15.6 ± 3.5 year of age versus 18.5 ± 7.3 years of age), and at first substance abuse treatment (mean 24.6 ± 4.7 versus 29.1 ± 7.7 years of age), and women had used cocaine for a significantly shorter period of time (mean 3.7 ± 2.2 years versus mean 5.4 ± 3.2 years). Men and women were similar in their total years of drug use (10.2 ± 5.4 versus 9.0 ± 4.7 years), their years of heavy drug use (5.2 ± 4.2 versus 4.3 ± 3.2), number of different drugs used during the previous 30 days (3.5 ± 2.8 versus 4.4 ± 2.7), amount of cocaine used during the past six months (106.3 ± 177.5 versus 107.5 ± 148.2 grams), but differed in the amount of money that they had spent on cocaine during the past six months ($\$9,375 \pm \$10,778$ versus $\$3,050 \pm \$3,382$). More men were married (40% versus 21%), and more women than men lived with a drug dependent partner (36% versus 21%). Men were more likely than women to be employed (78% versus 50%), and more likely to have professional, executive, or sales jobs (61% versus 20%).

Women gave four reasons for cocaine use, including depression, feeling unsociable, family and job pressures, and health problems. Men were more

likely to report that cocaine decreased libido (67% versus 38%), and men cited more intoxication effects from cocaine. Men and women did not differ in their reports of cocaine effects on aggression, appetite, anxiety, or mood. Nonetheless, women reported significantly less guilt as a cocaine effect (47% versus 23%) but most men and women (57%) reported they used cocaine to be more sociable and had experienced increased sociability.

Women were more likely to have an Axis 1 DSM-III-R diagnosis in addition to substance abuse. Depression was the most common psychological disorder, and most frequently reported by women. Antisocial personality on Axis 2 was reported only by men. In patients with depression, women had higher Hamilton Depression Rating Scale (HDRS) scores at admission, at 2 weeks after admission, and at 4 weeks after admission. For patients who had no diagnosis of major depression at admission, HDRS scores were similar for men and women at admission, with women having slightly elevated scores at 2 and at 4 weeks post-admission.

Griffin and coworkers also reported that the difference in depressive symptomatology between male and female cocaine users has persisted over time despite changes in the sociodemographic characteristics of patients, and that slower recovery from depression by women has remained remarkably constant. Involvement with a drug-dependent partner may have contributed to the more rapid development of addiction in some women, since cohabiting with a cocaine-using partner was more frequently reported by women. This observation also has been made for female opioid addicts (Kosten, Rounsaville, & Kleber, 1986) and in alcoholics (Hesselbrock, Meyer, & Keener, 1985).

Gender Differences Among Marijuana Smokers:

Two studies conducted in our laboratories investigated marijuana self-administration in young men (Babor, Mendelson, Greenberg, & Kuehnle, 1975) and in young women (Babor, Lex, Mendelson, & Mello, 1984). For each of these studies volunteers over age 21 were recruited through advertisements. All subjects were in good health and had used marijuana for at least two years. Subjects were classified as either "moderate" or "heavy" users on the basis of drug-use history interviews and self-report questionnaire data. Moderate smokers had used marijuana more than five times per month but less than daily during the previous year, while heavy smokers had used marijuana five or more times per week during the previous year.

Subjects were studied on a research unit for 35 days in groups of three or four that included both moderate and heavy smokers. Study protocols included: A seven-day drug-free baseline phase; a 21-day drug acquisition period during which marijuana cigarettes could be purchased on a free-choice basis; and a seven-day post-drug phase. During all phases subjects could work for points at a simple operant task that earned 50 cents per one-half hour of effort. During the 21-day acquisition period, points earned could either be exchanged directly for marijuana (50 cents per cigarette) or accumulated until the conclusion of the study, added to points earned during the baseline periods, and exchanged for money.

Male heavy smokers smoked early and consumed about four cigarettes per day at the beginning of the study and their consumption increased to about 6.5 cigarettes per day at the end of the study, while moderate smokers consumed about two cigarettes per day at the beginning of the study and increased their consumption to about three cigarettes per day by the end of the study (Babor

et al., 1975). Daily marijuana consumption for female heavy smokers averaged 3.5 cigarettes per day, and for moderate smokers, 1.4 cigarettes per day (Babor et al., 1984). Across the 21-day marijuana smoking interval heavy smoking women consumed significantly more marijuana than moderate smoking women and, in addition, their use patterns also fluctuated more throughout the study. However, for women no significant linear increases in marijuana smoking were apparent. Instead, over time marijuana consumption by heavy smokers showed a negligible decrease, and consumption by moderate smokers showed a negligible increase. Thus, it was predicted that daily marijuana consumption for women would increase over time but, this process did not occur. Moreover, no subject smoked on all 21-days on which marijuana could be acquired.

Thus, there are distinct patterns of marijuana consumption for men and women. It is possible that women's marijuana smoking patterns reflect social influences, such as the temporal pattern of weekday versus weekend smoking (Lex, Palmieri, Mello, & Mendelson, 1987). However, fluctuations also may be related to the greater amount of lipid tissue in females which can store and gradually release THC. To greater complicate interpretations, data from the study of women also indicated that for moderate smokers smoking increased on days when subjects reported heightened unpleasant moods, such as anger (Babor et al., 1984).

Escalation of marijuana use was observed in one woman who had smoked an average of 6.6 marijuana cigarettes per day during the three months prior to entering the study on the clinical research ward (Mendelson, Mello, Lex, & Bavli, 1984). During the 21 days of marijuana acquisition, this subject smoked a mean of 9.53 cigarettes per day, for a daily mean of 162.96 mg THC. On the 19th, 20th and 21st days of marijuana availability this subject smoked

18, 19, and 25 marijuana cigarettes, respectively. The marijuana abstinence syndrome closely resembled mild to moderate alcohol withdrawal. Within 10 hours after her last marijuana cigarette, she developed progressive anxiety, dysphoria, insomnia, anorexia, tremulousness of the extremities, lateral gaze nystagmus, diaphoresis, and exaggerated deep tendon reflexes (3+ and 4+), and symptoms peaked 48 hours after cessation of marijuana smoking. During this 48 hour interval, she reported increased tension, anger, and depression. Elevated depression ratings persisted up to 96 hours after cessation of marijuana smoking. Withdrawal symptoms were accompanied by a precipitous weight loss of 1-1.5 pounds per day during the first 72 hours post-smoking.

The amount of marijuana this subject smoked in the community was the greatest of any individual who had participated in either the male or female study series, and the quantity of 25 cigarettes smoked in one day in the research unit exceeded rates for all other female and male subjects. In this 50 kg woman, the daily dose of THC indicated that a dose of 3.5 mg/kg of body weight per day for three consecutive weeks was sufficient to induce physical dependence (Mendelson et al., 1984). This subject also consumed large quantities of alcohol (5+ drinks per day) in the community (Lex et al., 1987).

Family History of Alcoholism and Polysubstance Use

Appropriate studies of the putative Type II subtype of male alcoholism in females would compare characteristics of women involved in the criminal justice system to determine whether Type II behavior, which typically involves legal infractions, can be identified in women. Since Type II alcoholism in the Swedish cross-fostering studies was manifested in women as somatization (head, neck, and abdominal pains), it also would be necessary to determine the extent and type of intercurrent medical disorders as well as concurrent

substance abuse and dependence and life circumstances associated with the natural history of alcohol dependence in women with Type II traits.

Although putative Type II alcoholism has yet to be investigated in women with alcohol or polysubstance dependence, exploratory work can be conducted in potentially high risk populations, such as those with involvement in the criminal justice system. For example, a national survey of women's drinking problems conducted in 1981 reported that 17% reported driving while intoxicated (Wilsnack et al., 1984). An increasing number of women have come to the attention of the criminal justice system in response to more stringent enforcement and penalties (Argeriou, McCarty, Potter, & Holt, 1986) to the extent that one-third of all persons convicted for drinking and driving in Massachusetts in 1985 were female (LeClair, Felici, & Klotzbier, 1987).

We evaluated the first 20 women civilly committed to receive alcohol treatment at a new program at the Massachusetts Osteopathic Hospital (Lex et al., in press). Information included overall health, alcohol and drug use histories, reproductive histories, living situations, social and economic circumstances, legal problems, and background characteristics. Patients typically had completed high school, and all but one had worked at semi-skilled jobs or as homemakers. Convictions for driving while intoxicated were reported by 11 women, and 3 women had committed crimes against property. Patients begun drinking alcohol regularly during their teens or early twenties, and age of initial sexual intercourse closely paralleled their age at initiation of alcohol use. Of importance to genetic factors, 75% of the women had a family history of alcoholism.

Since our prospective studies of women's drug and alcohol use (Lex, Griffin, Mello, & Mendelson, 1986; Lex et al., 1987) had found that heavy frequent use of one substance is highly correlated with use of another,

patients were evaluated for polysubstance dependence and diagnosed as either alcohol dependent ($n = 12$) or polysubstance dependent ($n = 8$). The alcohol dependent women were significantly older at admission, older at reported age of initial alcohol use, and older at age of onset of regular alcoholic use. More alcohol dependent women lived alone or were homeless. The 8 women who were polysubstance dependent did not show a uniform pattern of substance use. The range of drugs used reflected the range of ages of women in the category. Cocaine was most frequently mentioned, followed by opiates, tranquilizers and sedatives, marijuana, amphetamines, and hallucinogens.

Family history of alcoholism also was a key variable that differentiated subgroups within the sample. In this cohort, three-fourths of all patients ($n = 15$) had a positive family history of alcoholism (one woman had been adopted and had no information about her biological parents). Alcohol ($n = 8$) and polysubstance ($n = 7$) dependent patients with a positive family history of alcoholism were compared. Although alcohol dependent women were significantly older (40.6 ± 11.4 years) than polysubstance dependent women (27.4 ± 5.8 years) ($t = 2.767$; $p = 0.016$), age did not appear to be a confounding factor that affected number of relatives reported. There were no significant differences between the two groups for total number of reported relatives, total number of reported alcoholic relatives, or the combined total number of alcoholic relatives and mates. Numbers of male and female relatives reported by patients in each diagnostic group were then separately compared. Polysubstance dependent women had significantly more alcoholic male relatives (mean 2.9 versus 1.8), and a trend toward greater combined total number of alcoholic male relatives and mates (mean 3.3 versus 2.3), but there was no significant difference between the 2 groups for mean number of female alcoholic relatives.

Findings are similar to those reported by Hill and colleagues (Hill, Armstrong, Steinhauer, Baughman, & Zubin, 1987) for adolescent sons and daughters in high density (alcoholic fathers and at least 2 alcoholic brothers) families with alcoholism, and by Kosten and coworkers at Yale (Kosten & Rounsaville, 1988) for female opiate users. In the most extreme case, one polysubstance dependent woman had a mother's father, mother's brother, brother, two sisters, son, and one daughter who were alcohol dependent, and this patient also had been married to 2 different men who were themselves brothers and alcohol dependent.

To underscore the seriousness of substance abuse problems in women, it is appropriate to end this review of our findings with a summary of derangements of female reproductive function. In addition to alcohol, cocaine, marijuana, and opiate use all have their effects on the female reproductive system (Mello et al., 1989). Alcohol, cocaine, marijuana, and opiates have been implicated in amenorrhea, anovulation, and spontaneous abortion, while alcohol, marijuana, and opiates have been implicated in luteal phase dysfunction, and alcohol, cocaine, and opiates, in hyperprolactinemia.

Future research topics:

These topics are by no means exhaustive, but point in helpful directions.

1. Differentiation of subjects by gender in cross-sectional, point prevalence, treated prevalence, longitudinal, and outcome studies is a prerequisite for establishing a useful database for substance abuse research and intervention programs.
2. Effects of substances on the neuroendocrine system in both women and men must be studied. The payoff will yield knowledge about fundamental

processes in the neurosciences and in endocrinology as well as for intervention and treatment of substance use.

3. More individuals are presenting for treatment with dual diagnoses, either of substance use and another Axis I disorder, or polysubstance use. Substance use by patients with other primary DSM-III-R Axis I categories of psychological disorders deserves greater attention, and possible use of alcohol or other substances to palliate psychological distress requires further study. These patients require more comprehensive evaluation and treatment, for which research will examine efficacy of modalities via outcome data.

4. Both familial/genetic and environmental variables are important in research and in treatment of substance use by either women or men. There is no valid dispute between "nature and nurture." "Nature-nurture" discussions engender fruitless debate when substance abuse is multidetermined. Instead, emphasis in analyses must shift to a broad spectrum of factors that are still poorly understood.

5. It cannot be assumed that substance use consumption patterns, research strategies, or treatment approaches will attain equilibrium. Since all these factors change over time, a single investigational strategy can yield only limited data. Changing patterns of substance use will present a challenge to clinicians that can be met in part by ongoing epidemiological research.

6. The costs to individuals and society for rehabilitation from the myriad effects of substance use are almost incalculable and affect all life areas. Contributions to knowledge about primary prevention should be a goal for both basic and applied scientists and treatment specialists. Cooperation from all

whose work touches upon substance abuse is necessary, since clinicians and applied scientists both interpret and guide treatment and research needs.

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REFERENCES

- American Psychiatric Association. (1987). *Diagnostic and statistical manual of mental disorders* (3rd. ed. rev.). Washington, DC: Author.
- Argeriou, M. A., McCarty, D., Potter, D., & Holt, L. (1986). Characteristics of men and women arrested for driving under the influence of liquor. *Alcoholism Treatment Quarterly*, 3, 127-137.
- Babor, T. F., Mendelson, J. H., Greenberg, I., & Kuehnle, J. C. (1975). Marihuana consumption and tolerance to physiological and subjective effects. *Archives of General Psychiatry*, 32, 1548-1552.
- Babor, T. F., Lex, B. W., Mendelson, J. H., & Mello, N. K. (1984). Marijuana, effect and tolerance: A study of subchronic self-administration in women. In L. H. Harris (Ed.), *Problems of drug dependence 1983*, NIDA (Research Monograph No 49). Washington, DC: U. S. Government Printing Office.
- Beckman, L. J., & Amaro, H. (1986). Personal and social difficulties faced by women and men entering alcoholism treatment. *Journal of Studies on Alcohol*, 47(2), 135-145.
- Blume, S. B. (1986). Women and Alcohol: A Review. *Journal of American Medical Association*, 256(11), 1467-1470.
- Bohman, M., Sigvardsson, S., & Cloninger, C. R. (1981). Maternal inheritance of alcohol abuse cross-fostering analysis of adopted women. *Archives of General Psychiatry*, 38, 965-969.
- Bromet, E., & Moos, R. (1976). Sex and marital status in relation to the characteristics of alcoholics. *Journal of Studies on Alcohol*, 37(9), 1302-1312.
- Cicero, T. J. (1980). Sex differences in the effects of alcohol and other psychoactive drugs on endocrine function: Clinical and experimental evidence. In O. J. Kalant (Ed), *Alcohol and drug problems in women*. (pp. 545-593). New York: Plenum.
- Clayton, R. L., Voss, H. L., Robbins, C., & Skinner, W. F. (1986). Gender differences in drug use: An epidemiological perspective. In B. A. Ray & M. C. Braude (Eds.), *Women and drugs: A new era for research*, NIDA (Research

- Monograph No 65, pp. 80-99, DHHS Publication No. ADM 86-1447) Rockville, MD: National Institute on Drug Abuse.
- Cloninger, C. R., Bohman, M., Sigvardsson, S., & von Knorring, A. L. (1985b). Psychopathology in adopted-out children of alcoholics: The Stockholm adoption study. In M. Galanter (Ed.), *Recent developments in alcoholism* Vol 3. (pp. 37-51). New York: Plenum.
- Cloninger, C., Sigvardsson, S., Reich, T., & Bohman, M. (1986). Inheritance of risk to develop alcoholism. In M. C. Braude & H. M. Chao (Eds.), *Genetic and biological markers in drug abuse and alcoholism*, NIDA (Research Monograph No. 66, pp. 86-96, DHHS Publication No. ADM 86-1444) Rockville, MD: National Institute on Drug Abuse.
- Corrigan, E. M. (1980). *Alcoholic women in treatment*. New York: Oxford University Press.
- Cotton, N. S. (1979). The familial incidence of alcoholism. *Journal of Studies on Alcohol*, 40(1), 89-116.
- Crawford, S., & Ryder, D. (1986). A study of sex differences in cognitive impairment in alcoholics using traditional and computer-based tests. *Drug and Alcohol Dependence*, 18, 369-375.
- Feighner, J., Robins, E., Guze, S. B., Woodruff, R. A., Winokur, G., & Munoz R. (1972). Diagnostic criteria for use in psychiatric research. *Archives of General Psychiatry*, 26, 57-63.
- Ferrence, R. G. (1980). Sex differences in the prevalence of problem drinking. In O. J. Kalant (Ed.), *Research advances in alcohol and drug problems*, Vol 5, alcohol and drug problems in women. (pp. 69-124) New York: Plenum.
- Ferrence, R. G., & Whitehead, P. C. (1980). Sex differences in psychoactive drug use: Recent epidemiology. In O. J. Kalant (Ed.), *Research advances and drug problems*, Vol 5, alcohol and drug problems in women (pp. 125-201). New York: Plenum.
- Gavaler, J. S. (1988). Effects of moderate consumption of alcoholic beverages on endocrine function in post-menopausal women: Bases for hypotheses. In M. Galanter (Ed.), *Recent developments in alcoholism* Vol 6. (pp. 229-251). New York: Plenum.
- Goodwin, D., Schulsinger, F., Hermansen, L., Guze, S. B., & Winokur, G. (1973). Alcohol problems in adoptees raised apart from alcoholic biologic parents. *Archives of General Psychiatry*, 28, 238-243.
- Goodwin, D. W., Schulsinger, F., Møller, N., Hermansen, L., Winokur, G., & Guze, S. B. (1974). Drinking problems in adopted and nonadopted sons of alcoholics. *Archives of General Psychiatry*, 31, 164-169.
- Goodwin, D. S., Schulsinger, F., Knop, H., Mednick, S. & Guze, S. B. (1977). Alcoholism and depression in adopted-out daughters of alcoholics. *Archives of General Psychiatry*, 34, 751-755.
- Griffin, M. L., Weiss, R. D., Mirin, S. M., & Lange, U. (1989). A comparison of male and female cocaine abusers. *Archives of General Psychiatry*, 46, 122-126.

- Halliday, A., Booker, B., Cleary, P., Aronson, M., & Delbanco, T. (1986). Alcohol abuse in women seeking gynecologic care. *Obstetrics and Gynecology*, 68, 322-326.
- Haver, B. (1987). Female alcoholics: III. Patterns of consumption 3-10 years after treatment. *Acta Psychiatrica Scandinavica*, 75, 397-404.
- Hesselbrock, M. N., Meyer, R. E., & Keener, J. J. (1985). Psychopathology in hospitalized alcoholics. *Archives of General Psychiatry*, 42, 1050-1055.
- Hill, S. Y., Armstrong, J., Steinhauer, S. R., Baughman, T., & Zubin, J. (1987). Static ataxia as a psychobiological marker for alcoholism. *Alcoholism: Clinical and Experimental Research*, 11, 345-348.
- Hugues, J. N., Coste, T., Perret, G., Jayle, M. F., Sebaoun, J., & Modigliani, E. (1980). Hypothalamo-pituitary ovarian function in thirty-one women with chronic alcoholism. *Clinical Endocrinology*, 12, 543-551.
- Hyman, M. M. (1976). Alcoholics 15 years later. *Annals of New York Academy of Science*, 273, 613-623.
- Kilbey, M. M., & Sobock, J. P. (1988). Epidemiology of alcoholism. In C. B. Travis (Ed.), *Women and health psychology*, (pp. 91-107). Hillsdale: Lawrence Erlbaum Associates.
- Kosten, T. R., Rounsaville, B. J. (1988). *Familial alcoholism in opioid addicts*. (Abstract) 50th Annual Meeting: Committee on Problems of Drug Dependence, Falmouth, MA.
- Kosten, T. R., Rounsaville, B. J., & Kleber, H. D. (1985). Ethnic and gender differences among opiate addicts. *International Journal of the Addictions*, 20(8), 1143-1162.
- Kosten, T. R., Rounsaville, B. J., & Kleber, H. D. (1986). A 2.5 year follow-up of treatment retention and reentry among opioid addicts. *Journal of Substance Abuse Treatment*, 3(3), 181-189.
- LeClair, D. P., Felici, L., & Klotzbier, E. (1987). *The use of prison confinement for the treatment of multiple drunken driver offenders: An evaluation of the Longwood Treatment Center*. Boston: Department of Corrections, Commonwealth of Massachusetts.
- Lex, B. W., Griffin, M. L., Mello, N. K., & Mendelson, J. H. (1986). Concordant alcohol and marihuana use in women. *Alcohol*, 3, 193-200.
- Lex, B. W., Palmieri, S. L., Mello, N. K., & Mendelson, J. H. (1987). Alcohol use, marijuana smoking, and sexual activity in women. *Alcohol*, 5, 21-25.
- Lex, B. W., Lukas, S. E., Greenwald, N. E., & Mendelson, J. H. (1988). Alcohol-induced changes in body sway in women at risk for alcoholism: A Pilot study. *Journal of Studies on Alcohol*, 49(4), 346-356.
- Lex, B. W., Teoh, S. K., Lagomasino, I., Mello, N. K., & Mendelson, J. H. (in press). Characteristics of women receiving mandated treatment for alcohol or polysubstance dependence in Massachusetts. *Drug and Alcohol Dependence*.

- Lisansky, E. S. (1957). Alcoholism in women: Social and psychological concomitants. *Quarterly Journal of Studies on Alcohol*, 18, 588-623.
- McKenna, T., & Pickens, R. (1981). Alcoholic children of alcoholics. *Journal of Studies on Alcohol*, 42(11), 1021-1029.
- Mello, N. K. (1980). Some behavioral and biological aspects of alcohol problems in women. In O. J. Kalant (Ed.), *Alcohol and drug problems in women* (pp. 263-312). New York: Plenum.
- Mello, N. K. (1983). Etiological theories of alcoholism. In N. K. Mello (Ed.), *Advances in substance abuse*, Vol 3. (pp. 271-312). Greenwich: JAI.
- Mello, N. K. (1988). Effects of alcohol abuse on reproductive function in women. In M. Galanter (Ed.), *Recent developments in alcoholism* Vol 6. (pp. 253-276). New York: Plenum.
- Mello, N. K., Mendelson, J. H., & Teoh, S. K. (1989). Neuroendocrine consequences of alcohol abuse in women. *Annals of New York Academy of Science*, 562, 211-240.
- Mendelson, J. H., Mello, N. K., Lex, B. W., & Bavli, S. (1984). Marijuana withdrawal syndrome in a woman. *American Journal of Psychiatry*, 141, 1289-1290.
- Midanik, L. (1983). Familial alcoholism and problem drinking in a national drinking practices survey. *Addictive Behaviour*, 8, 133-141.
- National Institute on Drug Abuse. (1985). *National Household Survey on Drug Abuse: Population Estimates 1985* (DHHS Publication No. ADM 87-1539). Washington, DC: U.S. Government Printing Office.
- National Institute on Drug Abuse. (1988). *National Household Survey on Drug Abuse: 1988 cross-sectional data*. News Release (HHS News, August, 1989), U.S. Department of Health and Human Services.
- National Institute on Drug Abuse. (1988). *National Household Survey on Drug Abuse: Population Estimates 1988* (DHHS Publication No. ADM 89-1636). Washington, DC: U.S. Government Printing Office.
- Orford, J., & Keddle, A. (1985). Gender differences in the functions and effects of moderate and excessive drinking. *British Journal of Clinical Psychology*, 24, 265-279.
- Parrella, D. P., & Filstead, W. J. (1988). Definition of onset in the development of onset-based alcoholism typologies. *Journal of Studies on Alcohol*, 49(1), 85-92.
- Reich, T., Cloninger, C. R., Van Eerdewegh, P., Rice, J. P., & Mullaney, J. (1988). Secular trends in the familial transmission of alcoholism. *Alcoholism: Clinical and Experimental Research*, 12(4), 458-464.
- Robins, L. N., Helzer, J. E., Weissman, M. M., Orvaschel, H., Gruenberg, E., Burker, J. D., Jr, & Regier, D. A. (1984). Lifetime prevalence of specific psychiatric disorders in three sites. *Archives of General Psychiatry*, 41, 949-958.

- Russell, M., & Bigler, L. (1979). Screening for alcohol-related problems in an outpatient obstetric-gynecologic clinic. *American Journal of Obstetrics and Gynecology*, 134(4), 4-12.
- Schuckit, M. A. (1984). Subjective responses to alcohol in sons of alcoholics and control subjects. *Archives of General Psychiatry*, 42, 879-884.
- Schuckit, M. A. (1985). Ethanol-induced changes in body sway in men at high alcoholism risk. *Archives of General Psychiatry*, 42, 375-379.
- Smith, E. M., Cloninger, C. R., & Bradford, S. (1983). Predictors of mortality in alcoholic women: A prospective follow-up study. *Alcoholism: Clinical and Experimental Research*, 7(2), 237-243.
- Streissguth, A. P., Sampson, P. D., & Barr, H. M. (1989). Neurobehavioral dose-response effects of prenatal alcohol exposure in humans from infancy to adulthood. *Annals of New York Academy of Science*, 562, 145-158.
- Swinson, R. P. (1980). Sex differences in the inheritance of alcoholism. In O. J. Kalant (Ed.), *Alcohol and drug problems in women* (pp. 233-262). New York: Plenum.
- Teoh, S. K., Lex, B. W., Cochlin, J., Mendelson, J. H., & Mello, N. K. (1989). Anterior pituitary gonadal and adrenal hormones in women with alcohol and polydrug abuse. 60th Anniversary Fifty-First Annual Scientific Meeting Abstracts, Keystone: The Committee on Problems of Drug Dependence, Inc.
- Van Thiel, D. H., & Gavalier, J. S. (1988). Ethanol metabolism and hepatotoxicity: Does sex make a difference? In M. Galanter (Ed.), *Recent developments in alcoholism* Vol 6. (pp. 291-304). New York: Plenum.
- Wilsnack, S. C., Klassen, A. D., & Wilsnack, R. W. (1984). Drinking and reproductive dysfunction among women in a 1981 national survey. *Alcoholism: Clinical and Experimental Research*, 8, 451-458.
- Wilsnack, S. C., Wilsnack, R. W., & Klassen, A. D. (1984). Drinking and drinking problems among women in a U.S. national survey. *Alcohol and Health Research World*, 9(1), 3-13.

Prevalence Estimates for Alcohol: Ever, Past Year, and Past Month (1988) by Age and Sex Groups for Total Population**

Age	Sex	Ever Used	Used in Past Year	Used in Past Month
12 to 17	Combined	50.2%	44.6%	25.2%
	Male	53.4	47.7	26.8
	Female	46.8	41.3	23.5
18 to 25	Combined	90.3	81.7	65.3
	Male	91.6	85.5	74.5
	Female	89.1	78.1	56.6
26 to 34	Combined	93.3	80.5	64.2
	Male	95.0	83.4	73.9
	Female	91.6	77.7	54.8
35 and Over	Combined	87.0	64.4	51.5
	Male	94.2	71.4	58.6
	Female	80.8	58.4	45.4
Total	Combined	85.0	68.1	53.4
	Male	89.5	73.3	60.6
	Female	80.8	63.3	46.7

**Population = 198,350,000 (Census Report August, 1988)

Source: National Household Survey on Drug Abuse: Population Estimates 1988, NIDA.

Prevalence Estimates for Any Illicit Use: Ever, Past Year, and Past Month (1988) by Age and Sex for Total Population**

Age	Sex	Ever Used	Used in Past Year	Used in Past Month
12 to 17	Combined	24.7%	16.8%	9.2%
	Male	23.7	15.8	9.5
	Female	25.7	17.9	8.9
18 to 25	Combined	58.9	32.0	17.8
	Male	58.8	36.8	21.8
	Female	59.1	27.3	14.1
26 to 34	Combined	64.2	22.6	13.0
	Male	69.9	27.9	16.4
	Female	58.8	17.6	9.6
35 and Over	Combined	23.0	5.8	2.1
	Male	26.8	6.4	2.5
	Female	19.7	5.2	1.8
Total	Combined	36.6	14.1	7.3
	Male	40.0	16.4	9.0
	Female	33.4	12.0	5.8

**Population = 198,350,000 (Census Report August, 1988)

Source: National Household Survey on Drug Abuse: Population Estimates 1988, NIDA.

Prevalence Estimates for Cocaine: Ever, Past Year, and Past Month (1988) by Age and Sex Groups for Total Population**

Age	Sex	Ever Used	Used in Past Year	Used in Past Month
12 to 17	Combined	3.4%	2.9%	1.1%
	Male	3.3	3.0	0.9
	Female	3.4	2.9	1.4
18 to 25	Combined	19.7	12.1	4.5
	Male	22.2	15.1	6.0
	Female	17.4	9.2	3.0
26 to 34	Combined	26.5	8.0	2.6
	Male	32.3	11.2	3.6
	Female	21.0	4.9	1.6
35 and Over	Combined	4.0	0.9	0.4
	Male	5.4	1.3	0.5
	Female	2.8	0.5	.
Total	Combined	10.7	4.1	1.5
	Male	13.1	5.6	2.0
	Female	8.5	2.8	1.0

*Low precision; no estimates reported

**Population = 198,350,000 (Census Report August, 1988)

Source: National Household Survey on Drug Abuse: Population Estimates 1988, NIDA.

Prevalence Estimates for Marijuana: Ever, Past Year, and Past Month (1988) by Age and Sex Groups for Total Population**

Age	Sex	Ever Used	Used in Past Year	Used in Past Month
12 to 17	Combined	17.4%	12.6%	6.4%
	Male	16.8	11.4	6.1
	Female	17.9	13.8	6.7
18 to 25	Combined	56.4	27.9	15.5
	Male	56.4	34.0	20.0
	Female	56.4	22.0	11.2
26 to 34	Combined	62.1	17.6	10.8
	Male	68.1	23.7	14.8
	Female	56.2	11.6	7.0
35 and Over	Combined	19.6	3.2	1.4
	Male	23.8	4.1	2.2
	Female	16.0	2.4	0.7
Total	Combined	33.2	10.6	5.9
	Male	36.9	13.4	7.9
	Female	29.7	8.1	4.0

**Population = 198,350,000 (Census Report August, 1988)

Source: National Household Survey on Drug Abuse: Population Estimates 1988, NIDA.

Prevalence Estimates for Alcohol: Frequency of Use within Past Year (1988) by Age and Sex Groups for Total Population**

Age	Sex	At Least Once	12 or More Times	Once a Week or More
12 to 17	Combined	44.6%	18.6%	5.7%
	Male	47.7	19.9	7.7
	Female	41.3	17.3	3.7
18 to 25	Combined	81.7	56.6	26.2
	Male	85.5	65.1	37.5
	Female	78.1	48.5	15.5
26 to 34	Combined	80.5	53.1	28.1
	Male	83.4	65.5	41.2
	Female	77.7	41.1	15.5
35 and Over	Combined	64.4	42.7	25.1
	Male	71.4	53.4	36.7
	Female	58.4	33.3	15.0
Total	Combined	68.1	44.3	23.9
	Male	73.3	54.0	34.5
	Female	63.3	35.5	14.1

**Population = 198,350,000 (Census Report August, 1988)

Source: National Household Survey on Drug Abuse: Population Estimates 1988, NIDA.

Prevalence Estimates for Cocaine: Frequency of Use within Past Year (1988) by Age and Sex Groups for Total Population**

Age	Sex	At Least Once	12 or More Times	Once a Week or More
12 to 17	Combined	2.9%	1.1%	0.5%
	Male	3.0	0.9	0.6
	Female	2.9	1.4	.
18 to 25	Combined	12.1	4.2	1.0
	Male	15.1	5.8	1.5
	Female	9.2	2.7	0.6
26 to 34	Combined	8.0	2.1	1.0
	Male	11.2	2.7	1.7
	Female	4.9	1.5	0.3
35 and Over	Combined	0.9	.	.
	Male	1.3	.	.
	Female	0.5	.	.
Total	Combined	4.1	1.2	0.4
	Male	5.6	1.6	0.7
	Female	2.8	0.8	0.2

*Low precision; no estimates reported

**Population =198,350,000 (Census Report August, 1988)

Source: National Household Survey on Drug Abuse: Population Estimates 1988, NIDA.

Prevalence Estimates for Marijuana: Frequency of Use within Past Year (1988) by Age and Sex Groups for Total Population**

Age	Sex	At Least Once	12 or More Times	Once a Week or More
12 to 17	Combined	12.6%	6.3%	3.9%
	Male	11.4	5.7	4.1
	Female	13.8	6.9	3.7
18 to 25	Combined	27.9	15.4	9.8
	Male	34.0	20.7	13.6
	Female	22.0	10.3	6.0
26 to 34	Combined	17.6	9.5	4.9
	Male	23.7	14.5	7.3
	Female	11.6	4.6	2.6
35 and Over	Combined	3.2	1.4	1.0
	Male	4.1	2.4	1.4
	Female	2.4	.	.
Total	Combined	10.6	5.6	3.3
	Male	13.4	8.0	4.8
	Female	8.1	3.4	2.0

*Low precision; no estimates reported

**Population = 198,350,000 (Census Report August, 1988)

Source: National Household Survey on Drug Abuse: Population Estimates 1988, NIDA.